

Communicate Your Understanding

- C1** Rohan claims that the following linear equations will have the same graph. Is he correct? Explain why or why not.

$$y = \frac{3}{4}x + 1 \text{ and } 4y = 3x + 4$$

- C2** If $y = 2x - 5$ and $3y = kx - 15$ are equivalent linear equations, what is the value of k ?

- C3** Are the linear systems A and B equivalent? Explain how you can tell from the equations. How could you check using a graph?

System A

$$y = 2x - 2$$

$$y = x + 1$$

System B

$$y = 2x - 2$$

$$2y = 2x + 2$$

- C4** The graph of the following linear system is shown.

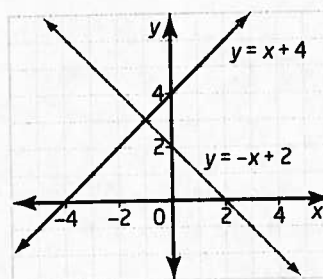
$$y = x + 4 \quad \textcircled{1}$$

$$y = -x + 2 \quad \textcircled{2}$$

The following is an equivalent linear system. Explain how you can tell from the graph. How can these equations be obtained from equations $\textcircled{1}$ and $\textcircled{2}$?

$$x = -1$$

$$y = 3$$



Practise

1. Which two equations are equivalent?

A $y = \frac{1}{2}x + 3$

B $y = x + 6$

C $2y = x + 6$

2. Which is *not* an equivalent linear relation?

A $8y = 12x + 4$

B $4y = 6x + 2$

C $2y = 3x + 4$

D $y = \frac{3}{2}x + \frac{1}{2}$

3. Write two equivalent equations for each.

a) $y = 3x - 2$

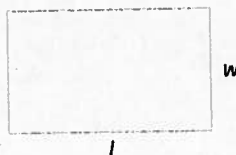
b) $3x + 6y = 12$

c) $y = \frac{3}{5}x + 2$

d) $8x + 4y = 10$

Connect and Apply

4. The perimeter of the rectangle is 24. Write an equation to represent this situation. Then, write an equivalent linear equation.



5. The value of the nickels and dimes in Tina's wallet is 70¢. Write an equation to represent this information. Then, write an equivalent linear equation.

6. A linear system is given.

$$3x - 6y = 15 \quad (1)$$

$$x + y = 3 \quad (2)$$

Explain why the following is an equivalent linear system.

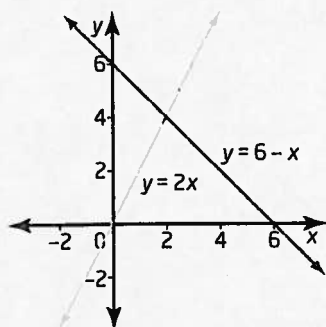
$$x - 2y = 5$$

$$2x + 2y = 6$$

7. A linear system is shown on the graph.

$$y = 2x \quad (1)$$

$$y = 6 - x \quad (2)$$



- a) Use a graph to show that the following is an equivalent linear system.

$$2y = x + 6 \quad (3)$$

$$0 = 3x - 6 \quad (4)$$

- b) How is equation (3) obtained from equations (1) and (2)?
c) How is equation (4) obtained from equations (1) and (2)?

8. A linear system is given.

$$y = \frac{2}{3}x - 1 \quad (1)$$

$$y = -\frac{1}{3}x + 2 \quad (2)$$

- a) Explain why the following is an equivalent linear system.

$$3y - 2x = -1 \quad (3)$$

$$3y + x = 2 \quad (4)$$

- b) If you graph the four equations, what result do you expect? Graph to check.

Extend

9. Work backward to build a more complicated linear system. Start with a solution, for example $x = 3$ and $y = -2$. Choose your own example.

- Write an equivalent linear system by adding and then subtracting the two equations in your solution.
- Multiply each equation from part a) by a different number to write another equivalent system.
- Use other ways to write equivalent linear equations to transform your linear system.
- Use graphing or substitution to check that your result in part c) has the same solution as you started with.
- Exchange your linear system from part c) with that of another student. Solve the linear system.

10. **Math Contest** The self-taught Indian mathematician Srinvasa Ramanujan (1887–1920) discovered more than 3000 theorems. One of his challenge problems was to find the least number that can be written as the sum of two cubes in two different ways. Find the number.

11. **Math Contest** If the two spinners shown are each spun once, what is the probability that the sum of the two numbers is either even or a multiple of 3?

A $\frac{7}{13}$ B $\frac{2}{3}$ C $\frac{1}{3}$ D $\frac{9}{13}$ E $\frac{3}{4}$

